Claims

1. A method of forming a silicide on a semiconductor substrate comprising the steps of:

providing a semiconductor substrate having an oxide on a surface thereof;

creating a vacuum over said surface having said oxide;

while in a said vacuum, removing said oxide from said surface of said substrate;

without breaking said vacuum, depositing a metal on said substrate surface; and

forming said silicide on said substrate surface.

2. The method of claim 1 wherein said substrate is a silicon substrate.

3. The method of claim 2 wherein said metal is cobalt.

4. The method of claim 3 wherein said silicide is cobalt silicide.

5. The method of claim 4 wherein said oxide is removed from said substrate surface by a nitrogen triflouride cleaning process.

6. The method of claim 6 wherein said metal is deposited on said substrate surface by a vapor sputtering process.

7. The method of claim 1 wherein said silicide is formed by annealing said substrate after said metal is deposited on said substrate surface.

8. The method of claim 1 wherein prior to said oxide removal step, said substrate is placed into a vacuum device, said vacuum device adapted to provide a continuous vacuum during said oxide removal and metal deposition steps.

9. The method of claim 8 wherein said vacuum device comprises a plurality of interior chambers, at least one chamber to remove said oxide and at least one chamber to deposit said metal; the method further comprising the step of transferring said substrate between said oxide removal chamber and said metal deposition chamber without breaking said vacuum.

10. An apparatus for forming a silicide on a surface of a semiconductor substrate, said apparatus being adapted to form a vacuum therein, said apparatus further adapted to remove an oxide from said surface of said substrate and deposit a metal on said surface of said substrate while maintaining said vacuum, said apparatus comprising:

a chamber;

at least one workpiece holder within said chamber adapted to hold said substrate;

at least one pump adapted to evacuate said chamber;

at least one line operatively connected between said at least one pump and said chamber for evacuating said chamber;

at least one input line adapted to provide a chemical agent into said chamber, said chemical agent adapted to remove said oxide from said surface of said substrate;

at least one output line adapted to remove said cleaning agent and said removed oxide from said chamber;

a heating element in said chamber, said heating element adapted to heat said substrate to an elevated temperature; and

a reactor in said chamber, said reactor adapted to deposit said metal onto said substrate surface.

11. The apparatus of claim 10 wherein said apparatus is further adapted to heat said substrate to form said silicide on said surface of said substrate.

12. The apparatus of claim 10 wherein said chamber comprises a plurality of interior chambers, at least one interior chamber adapted to remove said oxide from said surface of

said substrate while under said vacuum, and at least one interior chamber adapted to deposit said metal on said surface of said substrate while under said vacuum.

13. The apparatus of claim 12 further comprising at least one interior chamber adapted to heat said substrate.

14. The apparatus of claim 12 wherein said apparatus is adapted to transfer said substrate between said interior chamber adapted to remove said oxide from said surface of said substrate and said interior chamber adapted to deposit said metal on said surface of said substrate without breaking said vacuum.

15. The apparatus of claim 14 wherein said substrate is a silicon substrate.

16. The apparatus of claim 15 wherein said apparatus is adapted to remove said oxide from said surface of said substrate using a nitrogen triflouride cleaning process.

17. The apparatus of claim 16 wherein said metal is cobalt.

18. The apparatus of claim 17 wherein said interior chamber adapted to deposit said metal on said surface of said substrate is a vapor sputtering device.

19. The apparatus of claim 18 wherein said apparatus is further adapted to transfer said substrate to said heating chamber from said metal deposition chamber.

20. The apparatus of claim 19 wherein said silicide is cobalt silicide.